

An Ontology for Manufacturability and Constructability of Prefabricated Component

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ABSTRACT

Industrialized construction is gaining popularity in the industry due to its advantages of reducing pollution, shortening construction time, and increasing safety. However, the design process of industrialized construction projects is different from traditional design approaches, thus should consider not only the architectural and performance requirements but also the manufacturing and assembling requirements. Specifically, during the pre-construction design process, the designers have to consider the constraints of material, shapes, or mechanical property of the components from the assembly and manufacture technicians. In order to reduce design alteration times and improve the design efficiency, it is necessary to strengthen the communication and information interoperability between the designers, manufacturers, and contractors. The use of an ontology, an explicit formalization of a conceptualization that provides an abstract schema consisting of formal definitions of concepts and their relationships, is often applied to achieve semantic interoperability among different systems. The main objective of this paper is to present an ontology to support the manufacturability and constructability checking of prefabricated components. The methodology used in this research for developing the ontology includes four main steps: 1) purpose and scope definition, 2) taxonomy building, 3) relation modeling, and 4) ontology coding. A case study using Revit and a prototype application validates the exchange of information. It is expected that this developed ontology can provide the foundation for the establishment of a comprehensive prefabricated component manufacturability and constructability checking system.